



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/814,167

04/01/2004

Elisabetta Carrea

003-127

7378

36844

7590

05/03/2006

CERMAK & KENEALY LLP  
515 E. BRADDOCK RD  
SUITE B  
ALEXANDRIA, VA 22314

EXAMINER
----------

PRICE, CARL D

ART UNIT	PAPER NUMBER
----------	--------------

3749

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

E

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/814,167	CARREA, ELISABETTA	
	<b>Examiner</b>	<b>Art Unit</b>	
	CARL D. PRICE	3749	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \*See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 09/14/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### **Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

### **Claims: Rejected under 35 U.S.C. 102(b)**

Claims 1-4, 6, 8, 10, 12, 13, 17 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by US006007326 (Ryan, II et al).

US006007326 (Ryan, II et al) shows and disclose a combustion process comprising:

Art Unit: 3749

- forming a gas mixture from oxidant, fuel, and inert gas (See column 4, lines 43-51); and
- combusting the gas mixture in a burner under auto-ignition/self-ignition conditions (see column 4, lines 61-64);
- wherein combusting comprises flameless (see column 5, lines 23-27) combustion by forming an admixture in the burner,;
- wherein the oxidant comprises substantially pure oxygen or a mixture of substantially pure oxygen and substantially nitrogen-free inert gas produced from cryogenic or non-cryogenic air separation sources; and
- wherein forming the gas mixture comprises mixing the fuel or a mixture of fuel and inert gas at least at two locations in a burner arranged sequentially relative to a through-flow direction of the burner, at a upstream pre-combustion or front wall location (figure 1(a)) and at a downstream main combustion space or rear wall location (figure 1(b));
- a mixture forming device configured and arranged for the formation of a substantially nitrogen-free gas (see column 6, line 10-12; the amount of nitrogen being substantially reduced due to the use of pure oxygen) mixture of oxidant, fuel, and inert gas (e.g. – CO<sub>2</sub>), and having a burner configured and
- arranged for carrying out flameless combustion, the mixture forming device configured and arranged to bring oxygen and fuel together in the burner first to form a gas mixture having a temperature above the self-ignition temperature of the gas mixture;
- the internal exhaust gas recirculation system includes a swirler device (see column 4, lines 43-56) configured and arranged to swirl a gas flow of oxygen or a mixture of oxygen and exhaust gas before, or at an entry into, a combustion space of the burner.

**Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims: Rejected under 35 U.S.C. 103(a)**

Claims 5, 7, 9, 14, 15, 16, 20, 21, 22, 24, 25, 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US006007326 (Ryan, II et al) in view of US005888272 (Prasad et al).

US006007326 (Ryan, II et al) shows and discloses the invention substantially as set forth in the claims with possible exception to:

- admixing exhaust gas to oxygen, to fuel, or both, with an internal exhaust gas recirculation system by retaining a part of the exhaust gases in a combustion space of the burner, with an external exhaust gas recirculation system by extracting a part of the exhaust gases after the burner and recirculating the part of the exhaust gases to before the burner, or both;
- forming with a mixture of substantially pure oxygen and inert gas, including extracting oxygen with an oxygen transport membrane from an oxygen-

Art Unit: 3749

containing gas mixture arranged on a retentate side of the membrane, and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas;

- the combustion process comprises a combustion process for generating electrical current, heat or both;
- wherein, in the gas mixture, the volume ratio of inert gas to fuel and oxygen is greater than 1.5, or wherein the volume ratio of inert gas to fuel and oxygen is about 2.5;
- a gas turbine installation; and
- wherein the exhaust gas guidance device comprises a cross-sectional expansion.

**US005888272 (Prasad et al)** teaches, from applicant's same NO<sub>x</sub> gas reducing burner field of endeavor and for the same purpose of providing a means to reduce the formation of NO<sub>x</sub> during combustion by supplying a substantially nitrogen-free oxidant stream, admixing exhaust gas to oxygen, to fuel with an internal exhaust gas recirculation system by retaining a part of the exhaust gases in a combustion space of the burner, with an external exhaust gas recirculation system by extracting a part of the exhaust gases (17, 21, 22, etc.) after the burner and recirculating the part of the exhaust gases to before the burner. And, forming with a mixture of substantially pure oxygen and inert gas (10), including extracting oxygen with an oxygen transport membrane from an oxygen-containing gas mixture (1) arranged on a retentate side of a membrane (7a, 7b), and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas.

In regard to claims 5, 7, 9, 14, 15, 16, 20, 21, 22, 24, 25, 26 and 28, for the purpose of providing a means to supplying the substantially nitrogen-free oxidant stream and to provide means to further reduce the formation of NO<sub>x</sub>, it would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify **US006007326 (Ryan, II et**

Art Unit: 3749

al) to include a means forming the mixture of substantially pure oxygen with inert gas, including extracting oxygen with an oxygen transport membrane from an oxygen-containing gas mixture arranged on a retentate side of a membrane, and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas, in view of the teaching of **US005888272 (Prasad et al)**.

In regard to claims **22, 25** and **26**, Official Notice is taken that it is well known to operate combustion systems with means and as a process of generating electrical current such as in a gas turbine installation (see for example: **US004498289** including an NOx reducing integrated oxygen supply plant (12), NOx reducing exhaust gas recirculation and pre-combustion (14) and post combustion (20)) and to utilize a combustion chamber cross-sectional expansion to guide combustion chamber gases in a recirculation pattern (see for example: US005201650). Thus, in view of that which is well known it would have been obvious to a person having ordinary skill in the art to operate the **US006007326 (Ryan, II et al)** combustion system with means and/or as a process of generating electrical current such as in a gas turbine installation, and to utilize a combustion chamber cross-sectional expansion to guide combustion chamber gases in a recirculation pattern.

In regard to claims **5** and **24**, since the required volume ratio of inert gas and oxygen for a given combustion system would necessarily depend on a variety of design concerns and/or parameters, such as the over all shape and size of the apparatus, the type and amount of fuel used, etc., to form or operate **US006007326 (Ryan, II et al)** in accordance with the limitations set forth in these claims can be viewed as nothing more than merely matters of choice in design, absent the showing of any new or unexpected results produced therefrom over the prior art of record.

**Claims: Rejected under 35 U.S.C. 103(a)**

Art Unit: 3749

Claims 11, 17, 18, 19 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over **US005636977 (Benson et al)** in view of **JP 57-47119** and **US005888272 (Prasad et al)**.

**US005636977 (Benson et al)** shows and disclose a combustion process comprising:

- forming a gas mixture from oxidant, fuel, and inert gas (20); and
- combusting the gas mixture in a burner under auto-ignition/self-ignition conditions;
- wherein the oxidant comprises substantially pure oxygen or a mixture of substantially pure oxygen (see column 3, lines 18-25);
- wherein forming the gas mixture comprises mixing the fuel or a mixture of fuel and inert gas at least at two locations (20, 25; 30, 35, 40) in a burner arranged sequentially relative to a through-flow direction of the burner;
- a mixture forming device configured and arranged for the formation of a substantially nitrogen-free gas (the amount of nitrogen being substantially reduced due to the use of pure oxygen) mixture of oxidant, fuel, and inert gas (e.g. – CO<sub>2</sub>), and having a burner configured and arranged for carrying out combustion, the mixture forming device configured and arranged to bring oxygen and fuel together in the burner first to form a gas mixture having a temperature above the self-ignition temperature of the gas mixture;
- an internal exhaust gas recirculation system (40); and
- an external exhaust gas recirculation (see as labeled in figure 1).

**US005636977 (Benson et al)** shows and discloses the invention substantially as set forth in the claims with possible exception to:

- wherein combusting comprises flameless combustion by forming an admixture in the burner wherein the pre-combustion is performed in a catalytic burner having a lance extending through the pre-combustion catalyst and into the secondary combustion chamber;
- admixing exhaust gas to oxygen, to fuel, or both, with an internal exhaust gas recirculation system by retaining a part of the exhaust gases in a combustion



space of the burner, with an external exhaust gas recirculation system by extracting a part of the exhaust gases after the burner and recirculating the part of the exhaust gases to before the burner, or both;

- forming with a mixture of substantially pure oxygen and inert gas, including extracting oxygen with an oxygen transport membrane from an oxygen-containing gas mixture arranged on a retentate side of the membrane, and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas; and

**JP 57-47119** teaches, from applicant's same NO<sub>x</sub> gas reducing burner field of endeavor, combusting an fuel and oxidant mixture in a flameless combustion burner by forming an admixture in the burner wherein the pre-combustion is performed in a catalytic burner (13) having a fuel lance (15) extends through the pre-combustion catalyst and into the secondary combustion chamber (12, 13).

**US005888272 (Prasad et al)** teaches, from applicant's same NO<sub>x</sub> gas reducing burner field of endeavor and for the same purpose of providing a means to reduce the formation of NO<sub>x</sub> during combustion by supplying a substantially nitrogen-free oxidant stream, admixing exhaust gas to oxygen, to fuel with an internal exhaust gas recirculation system by retaining a part of the exhaust gases in a combustion space of the burner, with an external exhaust gas recirculation system by extracting a part of the exhaust gases (17, 21, 22, etc.) after the burner and recirculating the part of the exhaust gases to before the burner. And, forming with a mixture of substantially pure oxygen and inert gas (10), including extracting oxygen with an oxygen transport membrane from an oxygen-containing gas mixture (1) arranged on a retentate side of a membrane (7a, 7b), and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas.

In regard to claims 11, 17, 18, 19 and 27, for the purpose of aiding in the reduction of NO<sub>x</sub> gas formation, it would have been obvious to a person having ordinary skill in the art to modify **US005636977 (Benson et al)** to combust the fuel and oxidant mixture in a flameless

Art Unit: 3749

combustion burner by forming an admixture in the burner wherein the pre-combustion is performed in a catalytic burner having a fuel lance extends through the pre-combustion catalyst and into the secondary combustion chamber, in view of the teaching of **JP 57-47119**. Also, in regard to claims **11, 17, 18, 19** and **27**, for the purpose of providing a means to supplying the substantially nitrogen-free oxidant stream and to provide means to further reduce the formation of NO<sub>x</sub>, it would have been obvious to a person having ordinary skill in the art at the time of applicant's invention to modify **US005636977 (Benson et al)** to include a means forming the mixture of substantially pure oxygen with inert gas, including extracting oxygen with an oxygen transport membrane from an oxygen-containing gas mixture arranged on a retentate side of a membrane, and transporting the extracted oxygen to a permeate side of the membrane, and removing the transported oxygen by scavenging with the inert gas, in view of the teaching of **US005888272 (Prasad et al)**.

### **Conclusion**

See the attached USPTO form 892 for prior art made of record and not relied upon which is considered pertinent to applicant's disclosure.

### **USPTO CUSTOMER CONTACT INFORMATION**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **CARL D. PRICE** whose telephone number is **(571) 272-4880**. The examiner can normally be reached on **Monday through Friday between 6:30am-3:00pm**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Ehud Gartenberg** can be reached on **(571) 272-4828**. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 3749

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Carl D. Price', with a stylized, cursive script.

**CARL D. PRICE**  
**Primary Examiner**  
**Art Unit 3749**

cp